United States Department of Agriculture | Forest Service | NA Durham

Reply to: 3440 Date: September 2, 1994

Subject: Trip Report: Butternut Status on the Green Mountain National Forest

To: Jim Linnane

Background: Butternut occurrs throughout the Northeast, though not a common species. The tree is valued for its nut production for wildlife mast and for furniture wood. Butternut is becoming rare in forest stands today, as it is being devastated by butternut canker disease.

The disease was first reported from Wisconsin in the mid-1960's, but was probably in the United States prior to that time. The disease is now present throughout the range of butternut. The disease produces cankers that girdle branches and the main stem, causing mortality. There is no known control for the canker.

Efforts are now focused on finding resistant trees within infected stands. The North Central Forest Experiment Station (NCFES) working with interested conservation groups and state and federal agencies (the Butternut Coalition) has developed butternut retention guides, criteria for screening possible resistant trees, and the establishment of seed orchards with trees that are potentially resistant to butternut canker.

This report documents our findings on the condition of butternut on the Green Mountain National Forest. Our main goal was to assess the overall condition of butternut on the forest and also, to look for possible resistant trees.

Tree Conditions: Butternut is not common on the forest. Most of the time it is found as a single tree or in a small clump of trees. We looked at 6 areas on the forest that had been recorded as having the highest concentration of butternuts in one "stand". Evidence of the canker was found in all stands.

One criterion the NCFES uses for locating resistant trees states that candidate trees must be at least 100 feet from a disease tree for reasonable chance of exposure. Many trees did not fit this criterion due to the single tree type distribution.

Site 1, Mt. Tabor Work Center (Manchester RD). The trees in this area were fairly spread out and fairly heavily infected with canker. There were trees that were dead. Most were mid-sized (8"-14") trees. Butternut will probably be forced out of this site soon.

Site 2, Baker Peak Trailhead (Manchester RD). There was a fair number of trees in this cluster, all fairly close together. Size class of the trees ranged from small (6 in DBH) to large (approximately 18 in DBH). All trees had some signs of canker. Dead trees were present. Most live trees had decent crowns. Butternut could hang on in this site for some time into the future given that the smaller sized trees were the least infection.

(Butternut on the GMNF cont.)

Site 3, Forest Road 236 (Middlebury RD). This site had probably the best looking trees of all sites. There were some very large (over 20 in DBH) trees present. All trees had signs of canker, but at least in some cases there was evidence that the tree had started to wall off the infection. Crown conditions were good. This was very good butternut habitat. The trees in this area may be more susceptible to dying due age rather than the disease.

Site 4, Oak Ridge Trail (Middlebury RD). In the bottomlands there were a number of trees clustered together. Again, many were large and may be combating age before long. Cankers were evident, but this is very excellent butternut habitat. Probably the second best stand that we visited.

Site 5, Bristol (Middlebury RD). Butternut trees were more spread out in this stand, not as clumped. They were growing on the edge of a talus slope, and seemed kind of out of habitat. The trees had evidence of disease and overall didn't look as good as trees in other areas. Butternut will probably be pushed out of this area in the near future.

Site 6, Tunnel Brook (Rochester RD). There was a fair sized clump of trees in this area. There were a number of large trees, both dead and alive. There was evidence of stress probably due to cankers, age, and mechanical damage (Butternuts obviously made handy posts for which to wrap barbed wire fence around in days gone by). This was also good butternut habitat, but the trees just didn't look as good as in other areas. Would rate this as the third best stand.

Overall predictions. Butternut could probably be lost in all of these stands, unless it is managed. Some will hold out longer than others, but because of the ground cover and overstory in all these areas, butternut is not going to regenerate. However, since it is an early successional species, it may get started in other places on the Forest if there is a disturbance and a seed source.

Opportunities: The Forest already has started to aggressively manage to keep butternut as part of the ecosystem. They have a good idea of where butternut is located (even down to single trees). They are going to plant possible resistant seedlings in their seed orchard next year. Anywhere that butternut is established or could be established, it is accounted for in planning efforts.

We have one option to offer the Forest as a proposal to think about. Choose at least one area to manage for the purpose of increasing the abundance of butternut. It would take some aggressive management, such as site preparation and perhaps vegetation control for a couple years to make sure butternut got a foothold. We would recommend the site on Forest Road 236, Middlebury RD.

Seed from trees that are present could be collected, propagated and planted (perhaps even consideration of using tree shelters). This seed is not completely resistant, but there are a number of large trees present that presumably have withstood attacks by the disease overtime. There probably will be seedling mortality and possible complete failure if the disease hits hard. On the other hand, it may be possible to produce a small grove of butternut, that while not resistant still maintains the tree as part of the ecosystem.

We are willing to assist the Forest if there is interest in pursuing this option.

/s/ Mary Torsello
Forest Pathologist

/s/ Kurt Allen
Entomologist

Table 1A: Frequencies, Means, and Standard Deviations of Variables for Butternut Canker on Butternut Trees for 11 Sites in Vermont

	Barret	Berlin	Bovill	Cata.	Everet	Hill	Jericho	Major	River	VB	Westford	All
butternut tree #	25	367	50	183	25	34	118	14	69	16	119	1020
# living	96.0%	87.7%	100%	88.0%	68%	100%	91.6%	100%	88.4%	93.8%	95.0%	93.6%
# dead	4.0%	12.3%	0.0%	12.0%	32.0%	0.0%	8.4%	0.0%	11.6%	6.3%	5.0%	6.4%
dbh (inches)												
mean	13.9	15.7	11.6	12.8	13.1	13.9	10.7	13.5	13.8	12.2	9.3	13.3
standard deviation	7.2	3.4	3.0	5.2	3.8	5.4	5.0	4.1	6.2	4.9	5.1	5
crown class												
dominant	12.0%	13.1%	6.0	9.3%	20.0%	0.0%	5.1%	7.1%	13.0%	6.3%	10.9%	10.4%
codominant	76.0%	82.5%	88.0%	69.9%	68.0%	91.2%	71.8%	85.7%	71.0%	93.8%	77.3%	77.9%
intermediate	12.0%	4.2%	4.0%	16.9%	8.0%	5.9%	16.2%	0.0%	10.1%	0.0%	9.2%	9.1%
suppressed	0.0%	0.3%	2.0%	3.8%	4.0%	2.9%	6.8%	7.1%	5.8%	0.0%	2.5%	2.7%
%trees cankered												
cankered	96.0%	90.7%	86.0%	100%	100%	94.1%	84.3%	100%	100%	81.3%	99.2%	93.5%
not cankered	4.0%	9.3%	14.0%	0%	0%	5.9%	15.7%	0%	0%	18.8%	0.8%	6.5%
general quality												
unhealthy	88.0%	81.7%	76.0%	n.a.	96.0%	94.1%	87.4%	100%	n.a.	93.8%	n.a.	84.5%
fair form, healing	4.0%	8.4%	12.0%	n.a.	4.0%	2.9%	4.2%	0%	n.a.	0.0%	n.a.	6.9%
good form, healthy	4.0%	4.9%	6.0%	n.a.	0.0%	0.0%	5.0%	0%	n.a	6.3%	n.a.	4.5%
premium, healthy	4.0%	4.9%	6.0%	n.a.	0.0%	2.9%	3.4%	0%	n.a.	0.0%	n.a.	4.2%

Table 1B: Frequencies, Means, and Standard Deviations of Variables for Butternut Canker on Butternut Trees for 11 Sites in Vermont

	Barret	Berlin	Bovill	Cata.	Everet	Hill	Jericho	Major	River	VB	Westford	All
bole canker severity (0-8ft)												
none(0)	8.0%	22.3%	22.0%	0.0%	0.0%	17.6%	17.9%	0.0%	0.0%	18.8%	n.a.	12.0%
light(1-5)	28.0%	50.7%	44.0%	11.5%	24.0%	41.2%	40.2%	7.1%	15.9%	31.3%	40.3%	35.8%
moderate(6-10)	28.0%	12.3%	18.0%	20.8%	16.0%	26.5%	16.1%	20.6%	10.1%	12.5%	25.2%	17.2%
heavy(11-19)	20.0%	9.7%	10.0%	24.6%	40.0%	5.9%	14.3%	14.3%	13.0%	12.5%	14.3%	14.8%
severe(20+)	16.0%	4.9%	6.0%	43.2%	20.0%	8.8%	11.6%	50.0%	60.9%	25.0%	20.2%	20.2%
bole canker # (0-8ft)												
mean	9	4	5	n.a.	14	6	7	17	n.a.	13	n.a.	6
standard deviation	8	6	5	n.a.	11	6	8	11	n.a.	16	n.a.	8
bole canker severity (8-16ft)												
none(0)	32.0%	37.0%	42.0%	0.0%	12.0%	52.9%	41.4%	7.1%	0.0%	25.0%	n.a.	23.3%
light(1-5)	44.0%	51.6%	48.0%	18.0%	40.0%	41.2%	45.0%	21.4%	23.5%	43.8%	61.4%	42.3%
moderate(6-10)	20.0%	9.2%	8.0%	29.0%	44.0%	2.9%	9.9%	42.9%	17.6%	25.0%	21.1%	16.5%
heavy(11-19)	0.0%	1.7%	2.0%	28.4%	4.0%	2.9%	1.8%	21.4%	25.0%	0.0%	11.4%	9.7%
severe(20+)	4.0%	0.6%	0.0%	24.6%	0.0%	0.0%	1.8%	7.1%	33.8%	6.3%	6.1%	8.3%
bole canker # (8-16ft)												
mean	4	2	n.a.	n.a.	5	2	2	9	n.a.	n.a.	n.a.	3
standard deviation	5	3	n.a.	n.a.	3	3	4	7	n.a.	n.a.	n.a.	4
% roots cankered												
canker free roots	4.0%	13.9%	42.0%	0.0%	4.3%	8.8%	38.6%	0.0%	0.0%	31.3%	0.0%	12.5%
cankered roots	96.0%	86.1%	58.0%	100%	95.7%	91.2%	61.4%	100%	100%	68.8%	100%	87.5%
root canker # (per tree)												
mean	1.99	1.46	.75	2.49	2.16	2.00	0.97	2.41	2.75	1.52	2.10	1.78
standard deviation	1.09	1.13	.97	.62	.96	1.03	1.05	.96	.44	1.35	.69	1.11
tree root severity												
none (o)	4.0%	13.9%	42.0%	n.a.	4.3%	8.8%	38.6%	0.0%	n.a.	31.3%	n.a.	12.5%
light (1)	32.0%	37.7%	34.0%	9.9%	17.4%	20.6%	36.8%	21.4%	1.4%	18.8%	21.6%	26.1%
moderate (2)	16.0%	20.0%	16.0%	22.7%	26.1%	26.5%	9.6%	7.1%	20.3%	6.3%	42.2%	21.6%
heavy (3+)	48.0%	28.4%	8.0%	67.5%	52.2%	44.1%	14.9%	71.4%	78.3%	43.8%	36.2%	39.8%

Table 2: Dead Butternut Tree Characteristics: Frequencies, Mean, and Standard Deviation for 100 Butternut Trees on the Berlin Site in Berlin, Vermont

	percent	mean	standard deviation
Condition			
broken	40.0%		
blow down	56.0%		
standing dead	4.0%		
Year Since Mortality			
1-3 yrs (fine branches)	1.0%		
4-5 yrs (no fine branches)	10.0%		
6-10 yrs (stubby branches)	44.0%		
11+ yrs (no branches)	45.0%		
Canker Evidence			
no	72.0%		
yes	28.0%		
Diameter at Breast Height		13.0 inches	3.1 inches

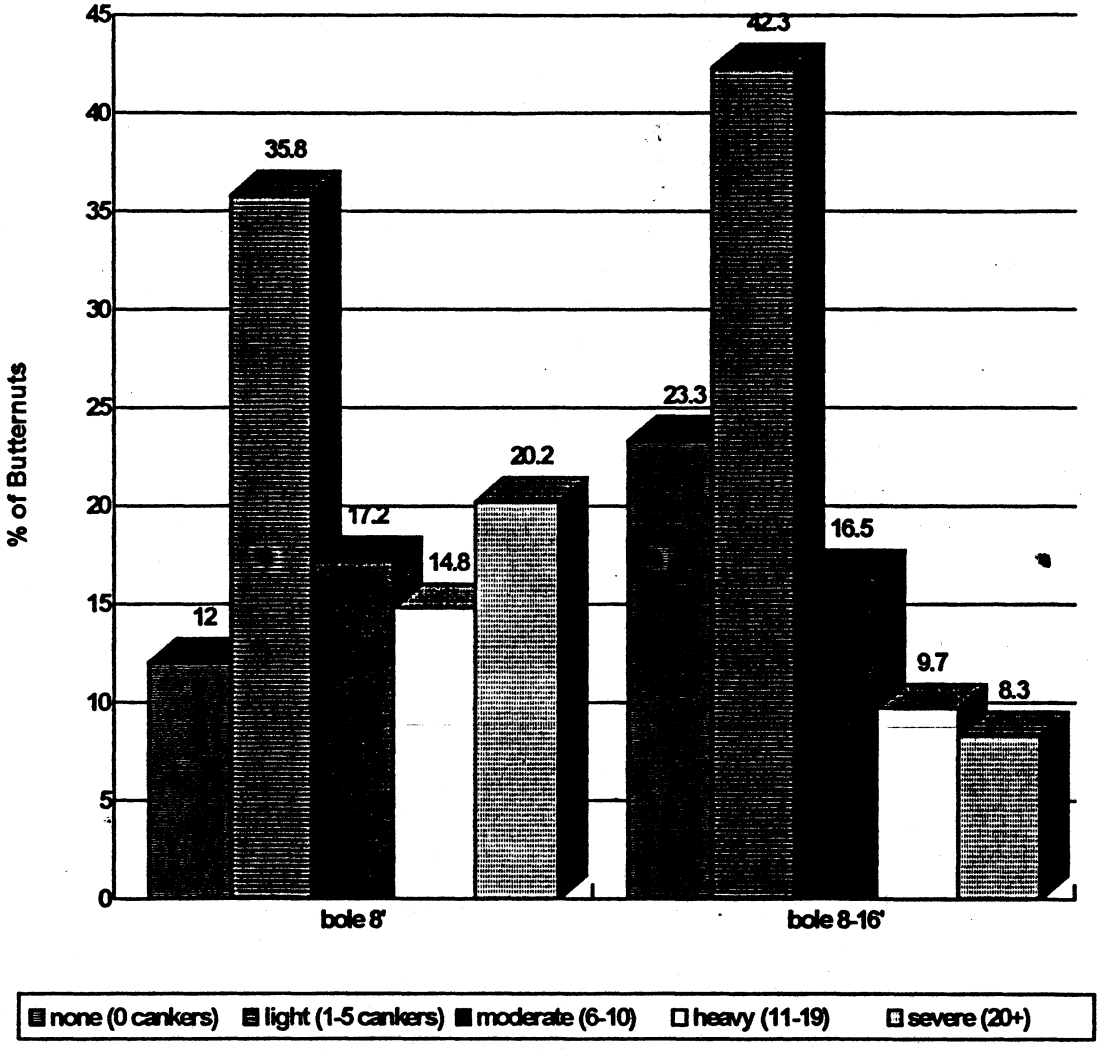
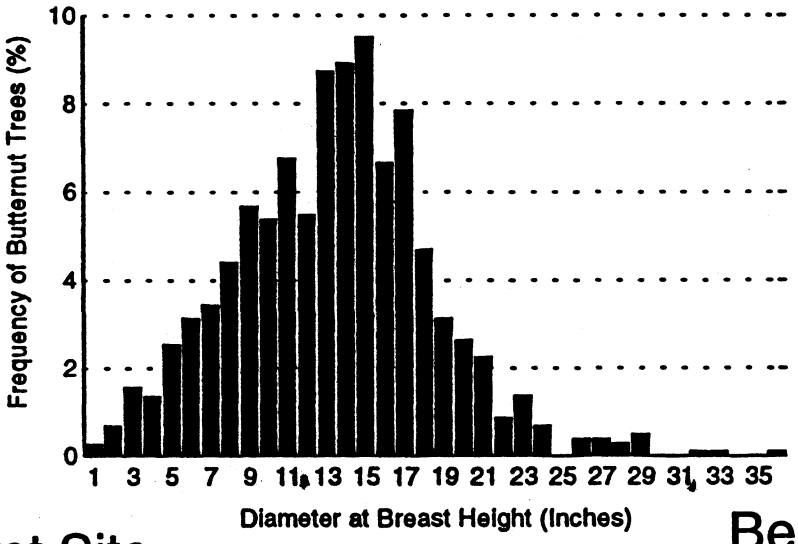


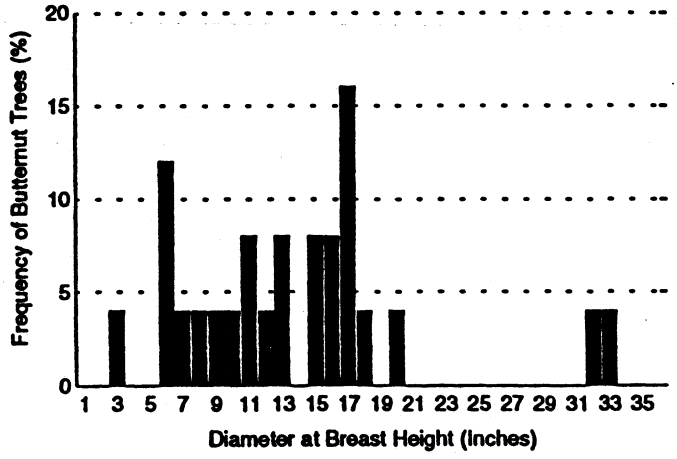
Figure 1: Severity of Butternut Cankering on the First 8 ft and 8-16 ft Sections of the Bole on All Eleven Sample Sites in Vermont

Fig. 2: Percent Distribution of Butternut Trees by 1" Diameter Classes for 11 Different Sites in Vermont

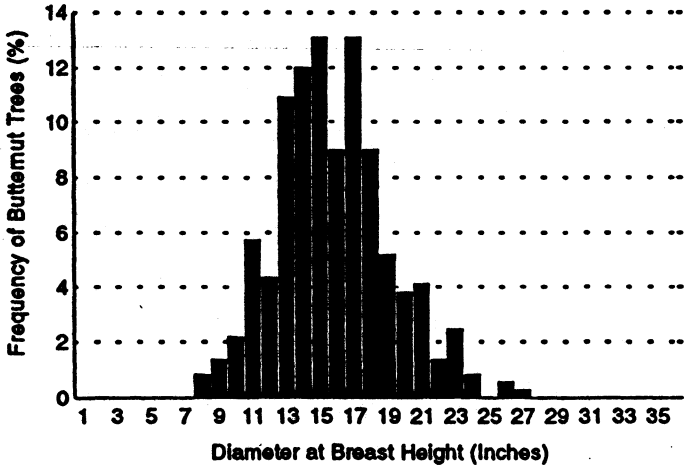
All Sites



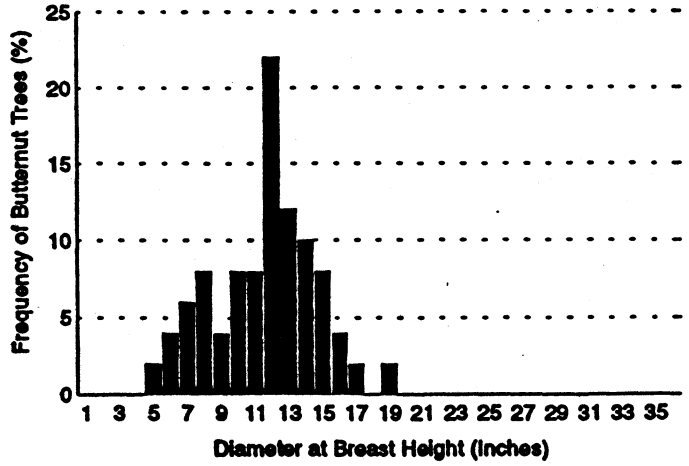
Barret Site



Berlin Site



Bovill Site



Everets Site

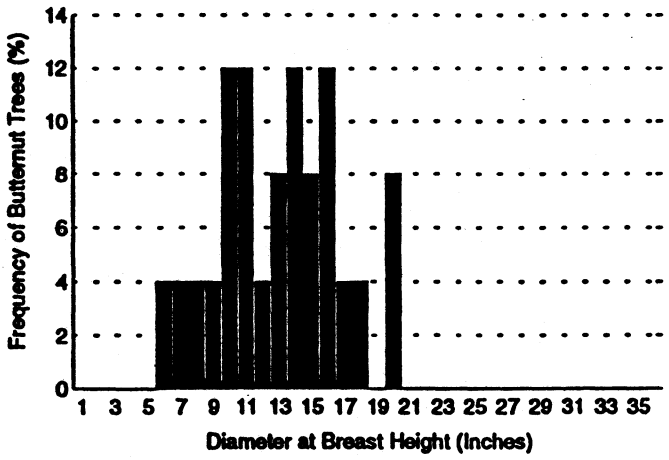
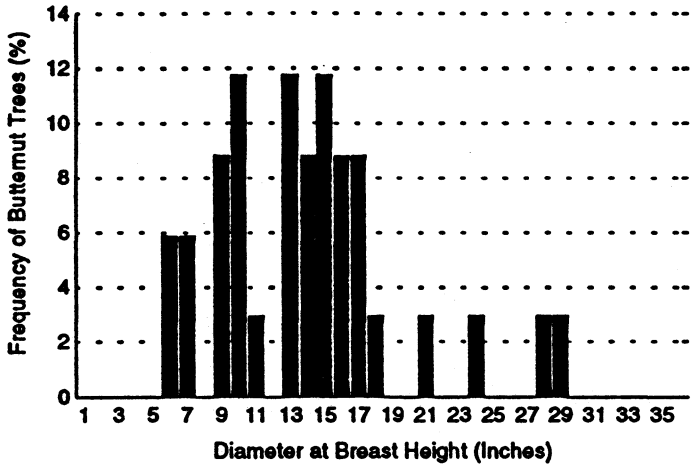
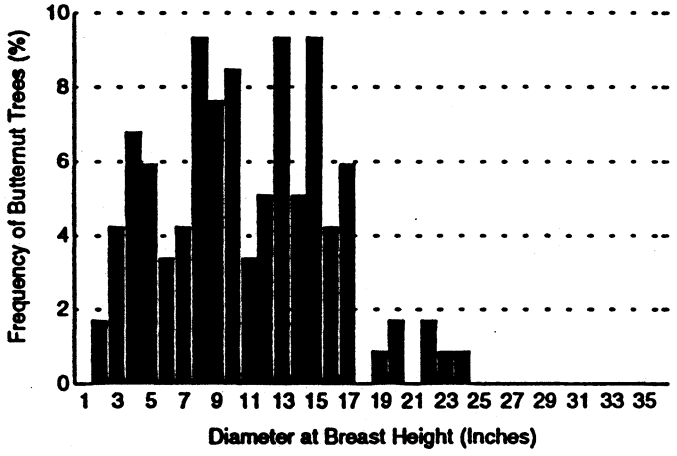


Fig. 2 (cont.): Percent Distribution of Butternut Trees by 1" Diameter Classes for 11 Different Sites in Vermont

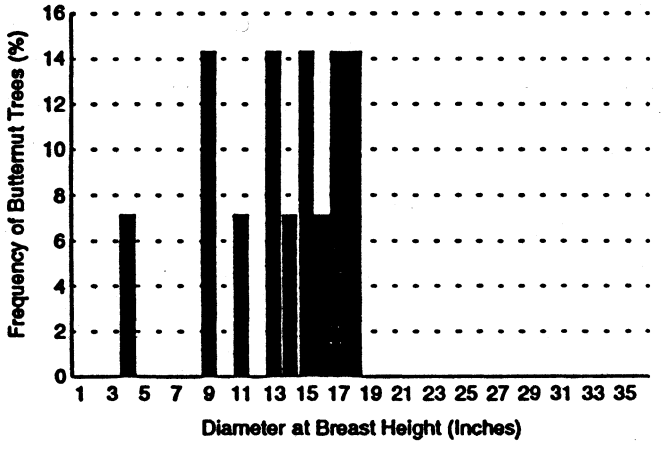
Hill Site



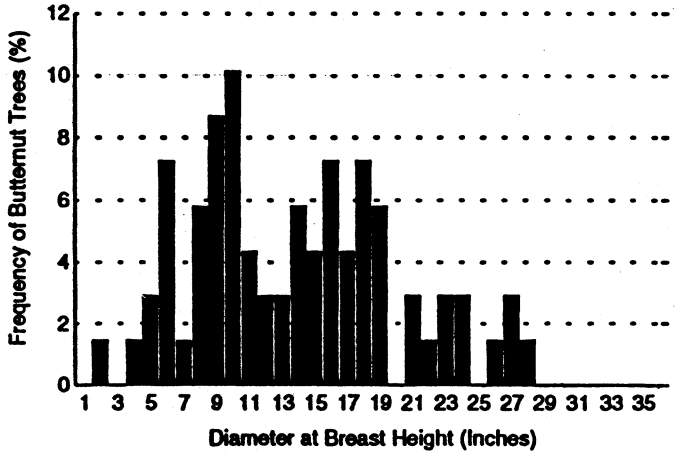
Jericho Site



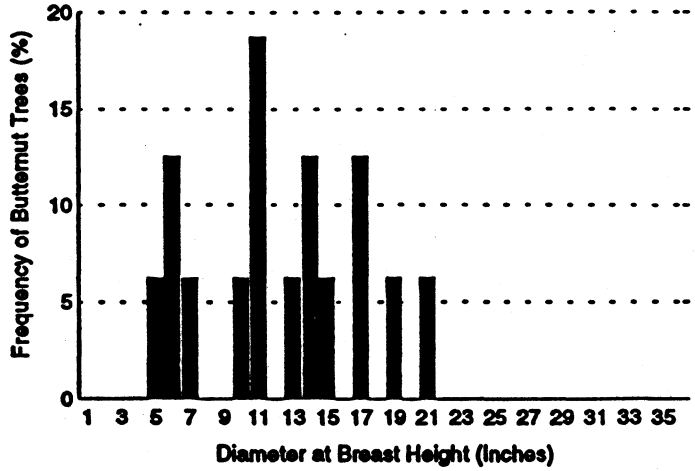
Major Site



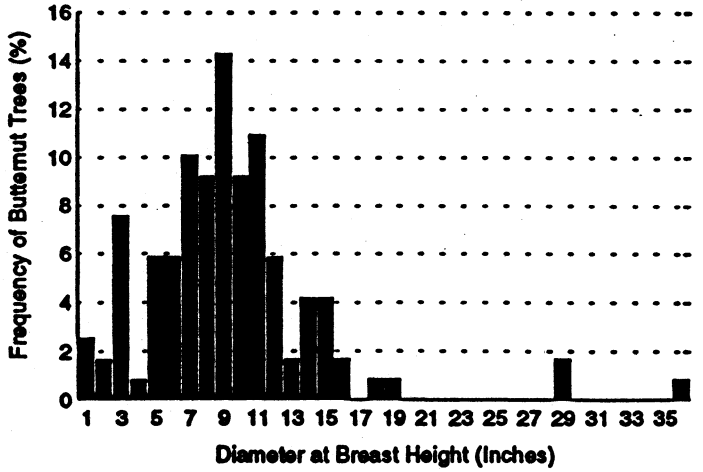
River Site



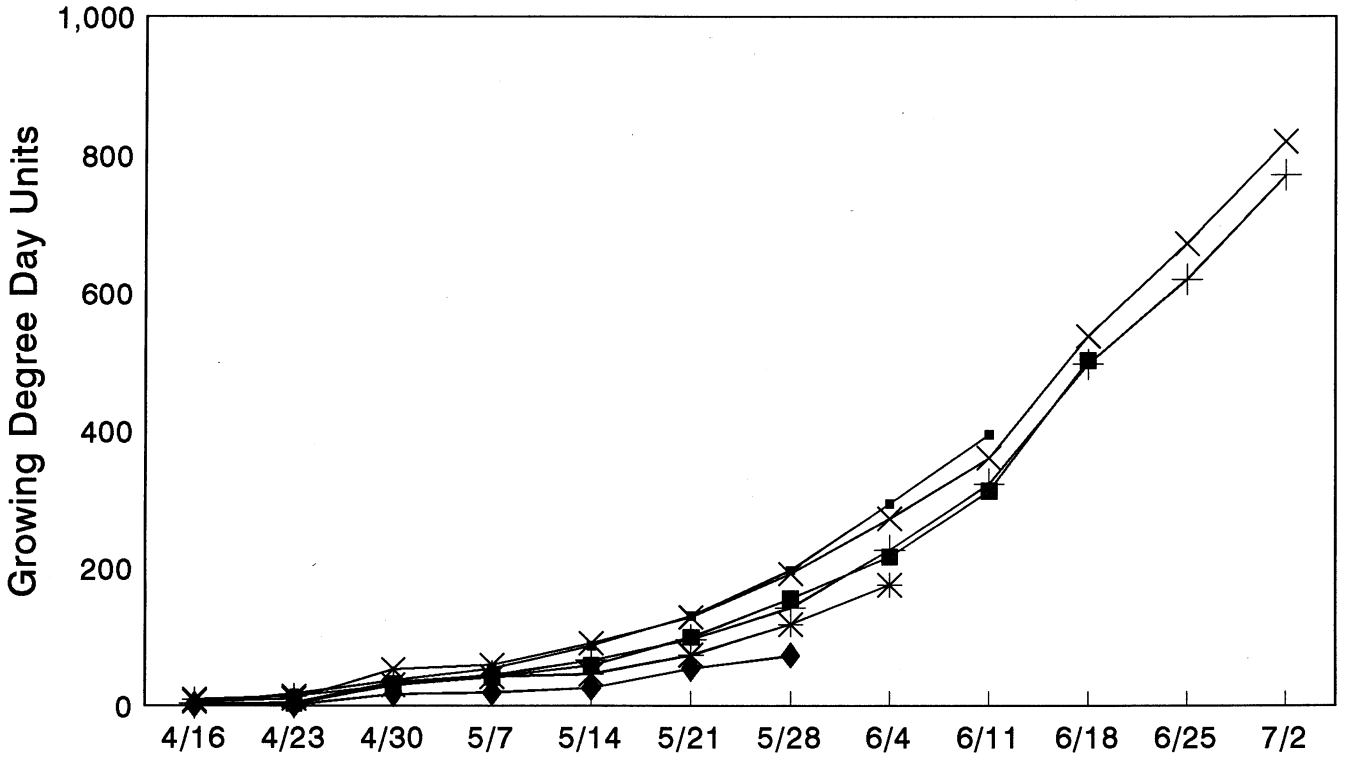
VB Site

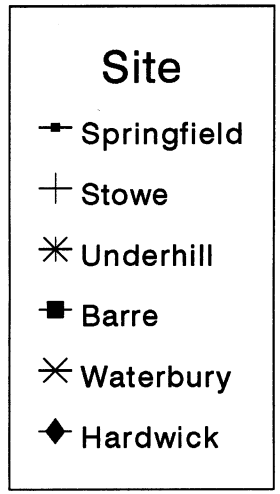


Westford Site



Comparison of 1994 Growing Degree Day Accumulations at Six Sites in Vermont





Springfield	3	17.5	37	54	87.5	131	197	294.5	395			
Stowe	3	4.5	34	44	66	96.5	142.5	227	323.5	497	620.5	771.5
Underhill	9	14	30	42.5	46	74	118.5	176				
Barre		3.5	30	42	58.5	100	156	217	313.5	502.5		
Waterbury	6	10.5	53	59.5	91	129	192	273	361	537.5	672.5	820
Hardwick	1.5	1.5	17	19	26	54	73					

Week Ending (Month/Day)

*50 degrees F used as the threshold of development

1994 Projects
Forest Health Protection

Northeastern Area | State and Private Forestry

Title: Compilation of Historical Database for a Comprehensive Insect and Disease Data Management System - VT

FHP Project No.:	94-94:D038	**Project Type:**	focus funds
1994 Funding:	$2,500	**Funding History:**	$2,500
Starting Date:	10/01/93	**Ending Date:**	09/30/95

FHP Coordinator: Bob Cooke; Durham Field Office, Telephone: (603) 868-7705

Cooperator(s): Trish Hanson, VT Dept of Forests, Parks and Recreation
Telephone: (802) 244-4510 X 141

Objectives: To evaluate the Forest Pest Conditions Database (FPCD) for its suitability in integrating existing pest locality and distribution data from voucher material and documented records held by the Vermont Department of Forests, Parks, and Recreation.

Approach: Collection data is entered into FPDC management system with respect to identification, location and seasonality. Pest status or other ecological/economic categories are also included with appropriate species. Constraints on data retrieval will be assessed with respect to major diagnostic and damage categories.

Products: Description of the system and its content (data source, classification, and critique of efficacy, and selected data outputs).

Accomplishments: Developed proposals for data entry categories in collaboration with Dan Twardus and Helen Machesky of the USFS, Morgantown, WV. Draft data program established and collection records ready for entry.

Publications: Not applicable at present.